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AUTHOR	Thompson, Russ; Fuller, Albert
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ABSTRACT

This teacher guide is part of the materials prepared for an individualized program for ninth-grade algebra and basic mathematics students. Materials written for the program are to be used with audiovisual lessons recorded on tape cassettes. For an evaluation of the program see ED 086 545. In this guide, the teacher is provided with objectives for each topic area and guided to materials written for a given topic. Three short criterion tests are included for each topic covered. Techniques for solving inequalities are presented in this package. This work was prepared under an ESEA Title III contract. (JP)

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ED 090016

ALGEBRA I

Package # 03-05

SOLVING INEQUALITIES AND PROBLEMS

Prepared By

Russ Thompson and Albert Fuller

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SE 017 569

SOLVING INEQUALITIES AND PROBLEMS

You learned in Package #4 to use transformations to solve equations. Now you must learn the transformations that are used to solve inequalities. You will also gain further experience in solving word problems. The word problems are very important. An ability to solve equations and inequalities is practically useless unless you can write the equations and inequalities necessary for the solution of a practical word prob[illegible]

PACKAGE GOAL: to be able to solve inequalities and to solve word problems.

PACKAGE OBJECTIVES

1. Given an inequality, write its solution.
2. Given two sets, specify their union and their intersection by graph.
3. Given a conjunction or disjunction, solve it and graph the solution set.
4. Given an open sentence involving absolute value, graph its solution set.
5. Given a problem about integers, write its solution.
6. Given a problem about angles, write its solution.
7. Given a uniform motion problem, write its solution.
8. Given a mixture problem, if possible, write its solution.

I.U. #03-05-01

AXIOMS OF ORDER

You will need to recall that:

< is the symbol for "is less than".
> is the symbol for "is greater than".

OBJECTIVES:

1. When asked to state the axiom of comparison, you will write, "For all real numbers a and b, one and only one of the following statements are true:

$$a < b$$
$$a = b$$
$$b < a$$

2. When asked to state the transitive axiom of order, you will write, "For all real numbers a, b and c: If $a < b$ and $b < c$, then $a < c$; if $a > b$ and $b > c$, then $a > c$."

3. Given an inequality, write its solution.

ACTIVITIES:

Study: S + M, pages 163--166. (Objectives 1, 2, and 3)

Suggested exercises: pages 167-168, exercises 1-27, odd numbers. (Objective 3)

CRITERION TESTS

Criterion Test 03-05-01-01

1. State the axiom of comparison.

2. State the transitive axiom of order.

3. Solve each inequality. (Show all steps.)

   (a) $x - 8 < {}^{-}70$
   (b) ${}^{-}3x + 6 > 2x - 14$
   (c) $5(4x + 2) - 3(5x + 1) \leq {}^{-}3$

Criterion Test 03-05-01-02

1. State the axiom of comparison.

2. State the transitive axiom of order.

3. Solve each inequality. (Show all steps.)

   (a) $x + 7 < {}^{-}8$
   (b) ${}^{-}5x + 2 > {}^{-}x - 10$
   (c) $3(3x - 2) - 5(x + 1) \leq 13$

Criterion Test 03-05-01-03

1. State the axiom of comparison.

2. State the transitive axiom of order.

3. Solve each inequality. (Show all steps.)

   (a) $x - 18 > {}^{-}5$
   (b) ${}^{-}6x + 5 > {}^{-}x + 10$
   (c) $2(4x - 1) - 3(2x + 6) \geq 6$

ANSWERS TO CRITERION TESTS

Criterion Test 03-05-01-01

1. For all real numbers a and b, one and only one of the following statements is true: $a < b$, $a = b$, $b < a$.

2. For all real numbers a, b, and c: If $a < b$ and $b < c$, then $a < c$; If $a > b$ and $b > c$, then $a > c$.

3. (a) $x - 8 < -70$
$x - 8 + 8 < -70 + 8$
$x < -62$

(b) $-3x + 6 > 2x - 14$
$-2x - 3x + 6 - 6 > -2x + 2x - 14 - 6$
$-5x > -20$
$\frac{-5x}{-5} < \frac{-20}{-5}$
$x < 4$

(c) $5(4x + 2) - 3(5x + 1) \leq -3$
$20x + 10 - 15x - 3 \leq -3$
$5x + 7 \leq -3$
$5x + 7 - 7 \leq -3 - 7$
$5x \leq -10$
$\frac{5x}{5} \leq \frac{-10}{5}$
$x \leq -2$

ANSWERS TO CRITERION TESTS

Criterion Test 03-05-01-02

1. For all real numbers a and b, one and only one of the following statements is true: $a < b$, $a = b$, $b < a$.

2. For all real numbers a, b, and c: If $a < b$ and $b < c$, then $a < c$; if $a > b$ and $b > c$, then $a > c$.

3. (a) $x + 7 < -8$
$x + 7 - 7 < -8 - 7$
$x < -15$

(b) $-5x + 2 > -x - 10$
$x - 5x + 2 - 2 > x - x - 10 - 2$
$-4x > -12$
$\frac{-4x}{-4} < \frac{-12}{-4}$
$x < 3$

(c) $3(3x-2)-5(x+1) \leq 13$
$9x-6-5x-5 \leq 13$
$4x-11 \leq 13$
$4x \leq 24$
$x \leq 6$

Criterion Test 03-05-01-03

1. For all real numbers a and b, one and only one of the following statements is true: $a < b$, $a = b$, $b < a$.

2. For all real numbers a, b, and c, If $a < b$ and $b < c$, then $a < c$; If $a > b$ and $b > c$, then $a > c$.

3. (a) $x - 18 > -5$
$x - 18 + 18 > -5 + 18$
$x > 13$

(b) $-6x + 5 > -x + 10$
$x - 6x + 5 - 5 > x - x + 10 - 5$
$-5x > 5$
$\frac{-5x}{-5} < \frac{5}{-5}$
$x < -1$

(c) $2(4x - 1) - 3(2x + 6) \geq 6$
$8x - 2 - 6x - 18 \geq 6$
$2x - 20 \geq 6$
$2x - 20 + 20 \geq 6 + 20$
$2x \geq 26$
$\frac{2x}{2} \geq \frac{26}{2}$
$x \geq 13$

I.U. # 03-05-02

INTERSECTION AND UNION OF SETS

OBJECTIVES:

1. Given two sets, specify their intersection by roster.
2. Given two sets, specify their union by roster.
3. Given two sets, indicate whether they are or are not disjoint.
4. Given two sets, specify their union and their intersection by graph.

ACTIVITIES:

Study: S + M, pages 168-170 (Objectives 1,2,3,4)

Suggested Exercises: page 171, exercises 5-14. (Objectives 1,2,3)
pages 171-172, exercises 15-25 odd numbers. (Objective 4)

Criterion Test 03-05-02-01

1. Specify by roster the intersection of the given sets.

   (a) {-1, -5, -8, -11} {-5, -8, -12 }
   (b) {0, 2, 4} {1, 3, 5 }

2. Specify by roster the union of the given sets.

   (a) {-1, -5, -8, -11} {-5, -8, -12}
   (b) {0, 2, 4} {1, 3, 5}

3. Which of the following pairs of sets are disjoint?

   (a) {-1, -5, -8, -11} {-5, -8, -12}
   (b) {0, 2, 4} {1, 3, 5}

4. Graph the intersection and the union of the given sets.

   {the real numbers between -2 and 3}
   {the positive real numbers}

Criterion Test 03-05-02-02

1. Specify by roster the intersection of the given sets.

   (a) {7, 12, 11, 14} {7, 12, 9}
   (b) {8, 6, 4} {3, 5, 7}

2. Specify by roster the union of the given sets.

   (a) {7, 12, 11, 14} {7, 12, 9}
   (b) {8, 6, 4} {3, 5, 7}

3. Which of the following pairs of sets are disjoint?

   (a) {7, 12, 11, 14} {7, 12, 9}
   (b) {8, 6, 4} {3, 5, 7}

4. Graph the intersection and the union of the given sets.

   {4 and the real numbers greater than 4}
   {the real numbers less than 5}

Criterion Test 03-05-02-03

1. Specify by roster the intersection of the given sets.

   (a) $\{^{-}2, {}^{-}1, 0, 1\}$ $\{0, 1, 2, 3\}$
   (b) $\{^{-}1, {}^{-}2, {}^{-}3\}$ $\{1, 2, 3\}$

2. Specify by roster the union of the given sets.

   (a) $\{^{-}2, {}^{-}1, 0, 1\}$ $\{0, 1, 2, 3\}$
   (b) $\{^{-}1, {}^{-}2, {}^{-}3\}$ $\{1, 2, 3\}$

3. Which of the following pairs of sets are disjoint?

   (a) $\{^{-}2, {}^{-}1, 0, 1\}$ $\{0, 1, 2, 3\}$
   (b) $\{^{-}1, {}^{-}2, {}^{-}3\}$ $\{1, 2, 3\}$

4. Graph the intersection and union of the given sets.

   {The real numbers greater than 1}

   {The real numbers greater than 3}

ANSWERS TO CRITERION TESTS

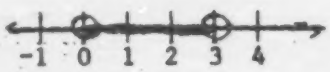
Criterion Test 03-05-02-01

1. (a) $\{^{-}5, ^{-}8\}$
   (b) $\emptyset$

2. (a) $\{^{-}1, ^{-}5, ^{-}8, ^{-}11, ^{-}12\}$
   (b) $\{0, 1, 2, 3, 4, 5\}$

3. (b) $\{0, 2, 4\}$ $\{1, 3, 5\}$

4. intersection:



   union

Criterion Test 03-05-02-02

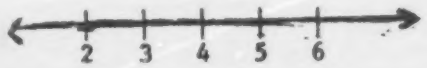
1. (a) $\{7, 12\}$
   (b) $\emptyset$

2. (a) $\{7, 9, 11, 12, 14\}$
   (b) $\{3, 4, 5, 6, 7, 8\}$

3. (b) $\{8, 6, 4\}$ $\{3, 5, 7\}$

4. intersection

   union



ANSWERS TO CRITERION TESTS

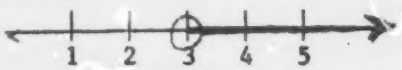
Criterion Test 03-05-02-03

1. (a) {0, 1}
   (b) $\emptyset$

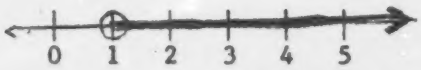
2. (a) {$^{-}2$, $^{-}1$, 0, 1, 2, 3}
   (b) {$^{-}1$, $^{-}2$, $^{-}3$, 1, 2, 3}

3. (b) {$^{-}1$, $^{-}2$, $^{-}3$} {1, 2, 3}

4. intersection



   union



I.U. #03-05-03

COMBINING INEQUALITIES

OBJECTIVE:

1. Given a conjunction or disjunction, solve it and graph the solution set.

ACTIVITIES:

Study:
S & M, pages 172-174 (Objective 1)

Suggested Exercises
S & M, page 175, ex. 1 - 19, odd (Objective 1)

CRITERION TESTS

Criterion Test 03-05-03-01

1. Solve and graph the solution set:
   (a) $1 \leq y + 6 \leq 5$

   (b) $6x - 3 > 9$ or $6x - 3 < 9$

   (c) $x - 3 > -1$ and $x + 5 \leq 9$

Criterion Test 03-05-03-02

1. Solve and graph the solution set:

   (a) $2 \leq x + 5 < 4$

   (b) $3x + 1 > 7$ or $3x + 1 < 7$

   (c) $x + 2 \geq -6$ and $x - 3 < 2$

Criterion Test 03-05-03-03

1. Solve and graph the solution set:

   (a) $-4 < -1 + x < 3$

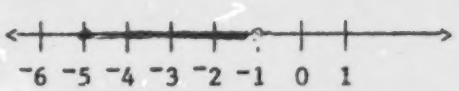
   (b) $2 + x \leq -4$ or $3 + x \geq 4$

   (c) $-4 - 3y > -13$ and $7 \geq 4 - 3y$

ANSWERS TO CRITERION TESTS

Criterion Test 03-05-03-01

1. (a)



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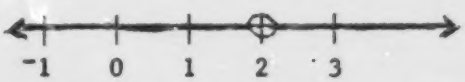

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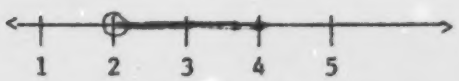
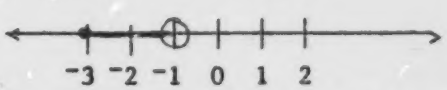


Criterion Test 03-05-03-02

1. (a)



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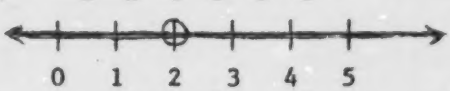

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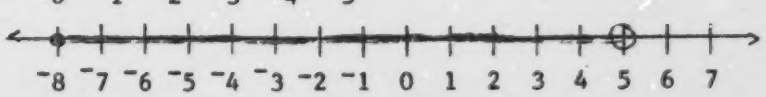
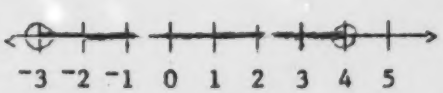


Criterion Test 03-05-03-03

1. (a)



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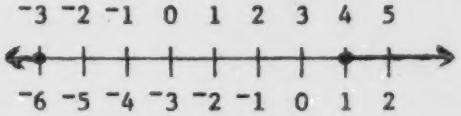


(c)

I.U. #03-05-04

ABSOLUTE VALUE IN OPEN SENTENCES

You will need to recall that:

Absolute value is always positive because it indicates the distance a number is from the origin (zero) on the number line.

OBJECTIVES:

1. Given an open sentence involving absolute value, graph its solution set.

ACTIVITIES:

Study:
S & M, pages 176-177. (Objective 1)

Suggested exercises:
S & M, page 177, ex. 1 - 17, odd, (written exercises) (Objective 1)

CRITERION TESTS

Criterion Test 03-05-04-01

1. Graph the solution set of each open sentence.
   (a) $|x + 3| = 7$
   (b) $|2 - x| \leq 1$
   (c) $3|x| \geq 9$

Criterion Test 03-05-04-02

1. Graph the solution set of each open sentence.

   (a) $|2x - 9| \leq 1$
   (b) $|x - 5| = 6$
   (c) $|x| - 5 \geq 2$

Criterion Test 03-05-04-03

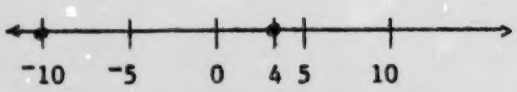
1. Graph the solution set of each open sentence.

   (a) $|x - 7| = 5$
   (b) $|2 - 2x| \leq 4$
   (c) $2|x| + 2 \geq 6$

ANSWERS TO CRITERION TESTS

Criterion Test 03-05-04-01

1. (a)



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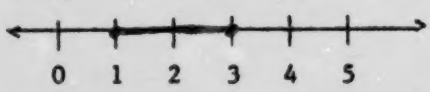

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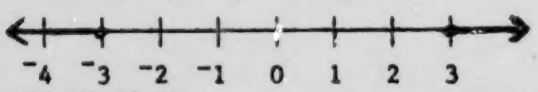
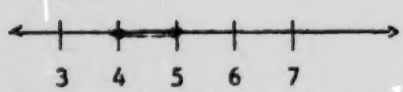


Criterion Test 03-05-04-02

1. (a)



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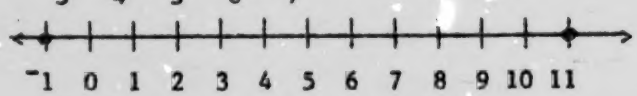

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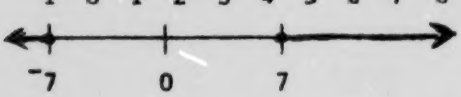
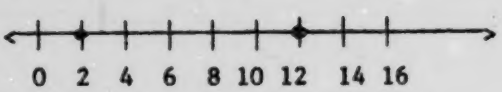


Criterion Test 03-05-04-03

1. (a)



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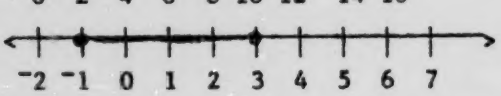

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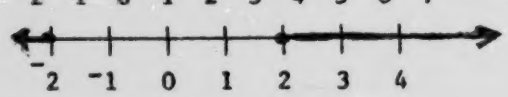

I. U. #03-05-05

PROBLEMS ABOUT INTEGERS

You will need to recall the definition of an integer.

OBJECTIVES:

1. Given an integer, write an expression for the next three consecutive integers.

2. Given an even integer, write an expression for the next three consecutive even integers.

3. Given an odd integer, write an expression for the next three consecutive odd integers.

4. Given an even integer, write an expression for the next three consecutive odd integers.

5. Given an odd integer write an expression for the next three consecutive even integers.

6. Given a problem about integers, write its solution.

ACTIVITIES:

1. Study pages 177 and 178. Answer the oral exercises on page 179. The answers to the oral exercises are in the Teacher's Manual.
(Objectives 1 - 5)

2. You will probably want to do the part A exercises on page 180 to be certain you have achieved Objective 6. If you like puzzles and challenges you will want to try some of the B and C exercises on pages 180, 181.

Criterion Test 03-05-05-01

1. If x is an integer, write expressions for the next three consecutive integers.

2. If y is an even integer write expressions for the next three consecutive even integers.

3. If z is an odd integer, write expressions for the next three consecutive odd integers.

4. If x is an even integer, write expressions for the next three consecutive even integers.

5. If y is an odd integer, write expressions for the next three consecutive even integers.

6. (a) Find the two greatest consecutive even integers whose sum is less than 70.

   (b) Find four consecutive integers if the sum of the second and fourth is 88.

   (c) Find the two least consecutive odd integers whose sum is more than 20.

   (d) The smaller of two consecutive odd integers is three more than twice the larger. Find the integers.

Criterion Test 03-03-05-02

1. If $(x + y)$ is an integer, write expressions for the next three consecutive integers.

2. If $(x - y)$ is an even integer, write expressions for the next three consecutive even integers.

3. If ab is an odd integer, write expressions for the next three consecutive odd integers.

4. If $2x$ is an even integer, write expressions for the next three consecutive odd integers.

5. If $(2x + 1)$ is an odd integer, write expressions for the next three consecutive even integers.

6. (a) Find the two greatest consecutive even integers whose sum is less than 40.

   (b) Find four consecutive integers if the sum of the first and fourth is 29.

   (c) Find the two least consecutive odd integers whose sum is greater than 40.

   (d) The smaller of two consecutive integers is four more than twice the larger. Find the integers.

Criterion Test 03-05-05-03

1. Write expression for the next three consecutive integers larger than 12.

2. Write expressions for the next three consecutive even integers larger than 12.

3. Write expressions for the next three consecutive odd integers larger than 9.

4. Write expressions for the next three consecutive odd integers larger than 12.

5. Write expressions for the next three consecutive even integers larger than 9.

6. (a) Find the four largest consecutive integers whose sum is less than 38.

   (b) If a rectangle has a perimeter of 80 inches and its width and length are consecutive odd integers, find its width and length.

   (c) Find the two smallest consecutive odd integers whose sum is greater than 50.

   (d) Find two consecutive odd integers such that the ratio of the smaller to the larger is three.

Answers to Criterion Tests

Test 03-05-05-01

1. $(x + 1)$, $(x + 2)$, $(x + 3)$
2. $(y + 2)$, $(y + 4)$, $(y + 6)$
3. $(z + 2)$, $(z + 4)$, $(z + 6)$
4. $(x + 1)$, $(x + 3)$, $(x + 5)$
5. $(y + 1)$, $(y + 3)$, $(y + 5)$
6. (a) 32, 34 (b) 42, 43, 44, 45
   (c) 11, 13 (d) -7, -5

Test 03-05-05-02

1. $(x + y) + 1$, $(x + y) + 2$, $(x + y) + 3$
2. $(x - y) + 2$, $(x - y) + 4$, $(x - y) + 6$
3. $ab + 2$, $ab + 4$, $ab + 6$
4. $2x + 1$, $2x + 3$, $2x + 5$
5. $2x + 2$, $2x + 4$, $2x + 6$
6. (a) 18, 20 (b) 13, 14, 15, 16
   (c) 21, 23 (d) -6, -5

Answers to Criterion Tests (Cont.)

Test 03-05-05-03

1. 12 + 1, 12 + 2, 12 + 3
2. 12 + 2, 12 + 4, 12 + 6
3. 9 + 2, 9 + 4, 9 + 6
4. 12 + 1, 12 + 3, 12 + 5
5. 9 + 1, 9 + 3, 9 + 5
6. (a) 7, 8, 9, 10 (b) 19", 21"
   (c) 25, 27 (d) -3, -1

I. U. #03-05-06

PROBLEMS ABOUT ANGLES

OBJECTIVES:

1. When asked to define angle, write "An angle is the union of two rays having a common endpoint".

2. Given a protractor and ruler, draw an angle of any given degree measure.

3. When asked to define complementary angles, write "Two angles are complementary angles if the sum of their degree measures is 90."

4. Given a protractor and ruler, draw a pair of complementary angles of any given degree measure and in any given position.

5. When asked to define supplementary angles write "Two angles are supplementary if the sum of their degree measures is 180".

6. Given a protractor and ruler, draw a pair of supplementary angles of any given degree measure and in any given position.

7. When asked to name the sum of the degree measures of the angles of any triangle, write "180".

8. Given a problem about angles, write its solution.

ACTIVITIES:

1. Study objectives 1, 3, 5, 7 and learn the meanings of the terms angle, complementary angle, supplementary angle, and the sum of the degree measures of the angles of a triangle. (Objectives 1, 3, 5, 7)

2. Watch tape 03-05-06 to learn how to use a protractor to draw an angle of a given degree measure if you do not already know how. (Objectives 2, 4, 6)

3. Study pages 181 - 184 S & M. Work exercises 1, 2, 10, on page 185 and problems, 1, 2, 7 on page 187. You may work more of these problems if you wish. You should work enough problems to be certain that you can do the ones related to complementary angles, supplementary angles, and the sum of the degree measures of the angles of a triangle.

Criterion Test 03-05-06-01

1. Define an angle.

2. Using a protractor and ruler, draw an angle of 45°.

3. Define Complementary angles.

4. Using a protractor and ruler draw a pair of complementary angles whose degree measures are 30° and 60° and whose vertices are at least one inch apart.

5. Define supplementary angles.

6. Using a protractor and ruler draw a pair of supplementary angles whose degree measures are 80° and 100° and whose vertices are on opposite ends of the same line segment. (Label the number of degrees in the angles.)

7. Name the sum of the degree measures of the angles of any triangle.

8. (a) Find the measure of an angle which is equal to twice its complement.

   (b) Find the measure of an angle for which the sum of its complement and supplement is 240°.

   (c) In an isosceles triangle, two angles have equal measure. Find the measure of each angle of an isosceles triangle in which twice the third angle is equal to the sum of the two equal angles.

Criterion Test 03-05-06-02

1. Define an angle.

2. Using a protractor and a ruler, draw an angle of 25°.

3. Define complementary angles.

4. Using a protractor and ruler draw a pair of complementary angles, one of which has a measure of 35°, with their vertices at least one inch apart.

5. Define supplementary angles.

6. Using a protractor and ruler draw a pair of supplementary angles, one of which has a measure of 45° and whose vertices are at least one inch apart.

7. How many degrees are the sum of the degree measures of the angles of a triangle?

8. (a) Find the measure of an angle which is five times its complement.

   (b) Find the measure of an angle for which the sum of its complement and supplement is 130°.

   (c) Find the measure of the angles of a triangle in which the first angle is 10° more than the second angle and the third angle is 40° more than the sum of the first and second angles.

Criterion Test 03-05-06-03

1. Define an angle.

2. Using a protractor and ruler draw an angle of 110°.

3. Define complementary angle.

4. Using a protractor and ruler, draw a pair of complementary angles, one of which has a measure of 25° and whose vertices are at least one inch apart.

5. Define supplementary angles.

6. With a protractor and ruler, draw a pair of supplementary angles one of which has a measure of 90° and whose vertices are on opposite ends of a line segment.

7. What is the sum of the degree measures of the angles of a triangle?

8. (a) Find the angle whose complement is two less than its supplement divided by two.

   (b) Find the degree measure of the angle whose supplement is five times the angle.

   (c) One angle of a triangle measures 20° more than a second angle, and the third angle measures twice as much as the first angle. Find the measures of each angle in the triangle.

Answers to Criterion Tests

Test 03-05-06-01

1. An angle is the union of two rays having a common end point.

2. Have the teacher check your drawing.

3. Two angles are complementary angles if the sum of their degree measures is 90.

4. Have the teacher check your drawing.

5. Two angles are supplementary if the sum of their degree measures is 180.

6. Have the teacher check your drawing.

7. 180°

8. (a) 60° (b) 15° (c) 60°

Test 03-05-06-02

1. An angle is the union of two rays having a common end point.

2. Have the teacher check your drawing.

3. Two angles are complementary angles if the sum of their degree measures is 90.

4. Have the teacher check your drawing.

5. Two angles are supplementary if the sum of their degree measures is 180.

6. Have the teacher check your drawing.

7. 180°

8. (a) 75° (b) 70° (c) 40°, 30°, 110°

Answers to Criterion Tests (Cont.)

Test 03-03-06-03

1. An angle is the union of two rays having a common end point.

2. Have the teacher check your drawing.

3. Two angles are complementary angles if the sum of their degree measures is 90.

4. Have the teacher check your drawing.

5. Two angles are supplementary if the sum of their degree measures is 180.

6. Have the teacher check your drawing.

7. 180°

8. (a) 4° (b) 30° (c) 50°, 30°, 100°

I. U. #03-05-07

UNIFORM MOTION PROBLEMS

OBJECTIVES:

1. When asked to write the uniform motion formula relating distance to rate and time, write $d = r \cdot t$.

2. Given a uniform motion problem, write its solution.

ACTIVITIES:

1. Study the formula $d = r \cdot t$ until you are certain that you understand its meaning. Solve it for r and t and study those forms of the formula until you are certain that they make sense to you. (Objective 1)

2. Study pages 188 - 190 examples 1 - 3 and work problems from Part A, pages 190 - 192 S & M. (Objective 2)

3. If you like puzzles and challenges, try some of the part B and C problems. (Objective 2)

Criterion Test 03-05-07-01

1. Write the uniform motion formula relating distance to rate and time.

2. (a) If a car could maintain a uniform speed of 60 miles per hour, how far could it travel in 8 hours?

   (b) If a car averages 75 miles per hour how long will it take it to travel 480 miles?

   (c) If it takes a car six hours to go 480 miles, what is its average rate?

   (d) If two planes leave Arnold at the same time and one travels east at 90 miles per hour and the other travels west at 120 miles per hour, in how many hours will the planes be 525 miles apart?

   (e) If the planes in problem (d) had both traveled east in how many hours will they be 120 miles apart?

   (f) If sound travels at 1080 ft/sec, how long will it take for you to hear an echo of your own voice reflect from a cliff that is 1620 feet away from you?

Criterion Test 03-05-07-02

1. Write the uniform motion formula relating distance to rate and time.

2. (a) If a canoe can go down stream at 12 miles per hour how far can it go in 4.5 hours?

   (b) If a motor boat can travel 25 miles per hour how long will it take to go 3 miles?

   (c) If a sailboat travels 25 miles in $2\frac{1}{2}$ hours what is its rate?

   (d) Izzie Speedy is driving down the interstate at 65 miles per hour. A highway patrolman is cruising a along four miles behind him at 75 miles per hour. How long will it take the patrolman to catch Izzie?

   (e) Two boats leave fisherman's bay at the same time and troll in opposite directions. If they leave at 6:00 AM and one goes east at .5 miles per hour and the other goes west at .75 miles per hour, how far apart will they be at noon?

   (f) Two space ships pass each other in outer space. They are on parallel courses but they are traveling in the opposite directions. If each is traveling at 24,000 miles per hour, in how long will they be 1 astronomical unit apart? (One astronomical unit is the distance from the earth to the sun. 93,000,000 miles.)

Criterion Test 03-05-07-03

1. Write the uniform motion formula relating distance, rate, and time.

2. (a) If John drives his car at 55 miles per hour for fifteen minutes, how far will he go?

   (b) If John drives his car $137\frac{1}{2}$ miles at 55 miles per hour, how long will it take him?

   (c) If John drives his car 150 miles in 3 hours and 15 minutes, what is his average speed?

   (d) Jackson is 835 miles from Podunk. Two cars leave Jackson and Podunk at the same time and drive towards each other. One car travels twice as fast as the other, if it takes them 10 hours to meet, what are their speeds?

   (e) In a 41 mile canoe race the fastest canoe travels at 14.2 miles per hour and the slowest canoe travels at 10.5 miles per hour. What is the distance between them when the fastest canoe crosses the finish line?

   (f) A ship is 180 miles from shore and sailing directly towards it when a helicopter leaves shore and flies towards the ship at 90 knots. If the rate of the ship is 30 knots how long will it take the helicopter to reach the ship? (Knots - nautical miles per hour.)

Answers to Criterion Tests

Test 03-05-07-01

1. $d = r \cdot t$

2. (a) 480 miles (b) 6.4 hours (c) 80 m.p.h.

   (d) 2.5 hours (e) 4 hours (c) 3 seconds

Test 03-05-07-02

1. $d = r \cdot t$

2. (a) 54 miles (b) .12 hours (c) 10 m.p.h.

   (d) .4 hours (e) 7.3 miles (f) 1937.5 hours

Test 03-05-07-03

1. $d = r \cdot t$

2. (a) 13.75 miles (b) 2.5 hours (c) 46.1538 m.p.h.

   (d) $27.8\overline{3}$ m.p.h., $55.\overline{6}$ m.p.h. (e) 10.68 miles

   (f) 1.5 hours

I.U. 03-05-08

MIXTURE PROBLEMS

OBJECTIVE:

Given a mixture problem, write its solution.

ACTIVITIES:

1. Study pages 193 - 194. (Objective 1)

2. Suggested exercises: Oral exercises on page 194. The answers are in the Teacher's Manual. (Objective 1)

3. Do the even-numbered problems in Part A on pages 194 - 195. (Objective 1)

4. If you like puzzles and challenges, you will want to try some of the Part B and C problems. (reinforcement of Objective 1)

CRITERION TESTS:

Criterion Test 03-05-08-01

1. Solve the following problems:

   (a) Jim has three less than three times as many dimes as he has quarters. If he has $3.00 in all, how many coins of each type does he have?

   (b) Airline fares from North Platte to Denver are $30.00 for first class and $25.00 for tourist class. If a flight carried 52 passengers for $1510.00, how many tourist class passengers were on the flight?

   (c) Sam Collector bought thirty-four stamps for $2.21. Some were 5¢ stamps and some were 8¢ stamps. How many of each kind did he buy?

Criterion Test 03-05-08-02

1. Solve the following problems:

   (a) Jim has two less than twice as many quarters as he has nickels. If he has $4.45 worth in all, how many coins of each type does he have?

   (b) Airline fares from Omaha to Denver are $45.00 for first class and $30.00 for tourist class. If a flight carried 50 passengers for $1950.00, how many tourist class passengers were on the plane?

   (c) Bill bought some 8¢ stamps and some 5¢ stamps. If he bought $6.25 worth of stamps, how many of each kind did he buy? (Bill bought 95 stamps)

Criterion Test 03-05-08-03

1. Solve the following problems:

   (a) Mo Vie runs a theater. He charges 35¢ for children and $1.00 for adults. Friday night there were 300 people at a show and Mo took in $209.00. How many adult tickets did he sell?

   (b) Lunches cost $1.35 and dinners cost $1.50. Joe took in $30.00 and served 22 people. How many dinners did he sell?

   (c) Portable T.V.s cost $75.00 each. Special video tape recorder monitors cost $225.00 each. The portable T.V.s and the monitors bought for the math program cost $825.00. There are seven sets in all. How many of each type were purchased?

Answers to Criterion Tests

Test 03-05-08-01

1. (A) 6 quarters 15 dimes

   (B) 10 tourist 42 first class

   (C) 17 5¢ stamps and 17 8¢ stamps

Test 03-05-08-02

1. (A) 9 nickles and 16 quarters

   (B) 20 tourist class

   (C) 50 8¢ stamps and 45 five cent stamps

Test 03-05-08-03

1. (A) 160 adult tickets

   (B) 2 dinners

   (C) 5 portables, 2 monitors

The End